IN THE CLAIMS:

Set forth below in ascending order, with status identifiers, is a complete listing of all claims currently under examination. Changes to any amended claims are indicated by strikethrough and underlining. This listing also reflects any cancellation and/or addition of claims.

Claim 1 (currently amended)

An actuator, comprising:~~having~~

a movable member having a first biological material deposited thereon;

a second biological material positioned so as to interact with the first biological material;

an energy-transmitting stripe associated with the second biological material so as to energize the second biological material with a first type of energy; and

a reservoir containing a substance that is a source of a second type of energy, wherein the reservoir is positioned so as to retain the substance in contact with the first and second biological materials to aid interaction of the first and second biological materials,

wherein, when the stripe is energized, the movable member~~that~~ moves substantially linearly as a result of the~~a biomolecular~~ interaction of the first and second biological materials~~biologically based components within the actuator~~.

Claim 2 (currently amended)

The actuator of claim 15~~1~~, wherein the myosin comprises myosin S1 or heavy meromyosin~~movable member is coated at least in part with a first interactive biological material~~.

Claim 3 (currently amended)

The actuator of claim 15~~1~~, wherein the movable member is a rod having a longitudinal dimension of about 100 nm to about 100 μm and a cross sectional dimension of about 20 nm to about 200 nm.

Claim 4 (currently amended)

The actuator of claim 15~~1~~, wherein the movable member is curved.

Claim 5 (currently amended)

The actuator of claim 152, wherein the movable member comprises nickel, palladium, gold, platinum, cobalt, permalloy, chromium, or a combinationmixtures thereof.

Claim 6 (currently amended)

The actuator of claim 152, wherein the movable member comprises a polymeric material.

Claim 7 (currently amended)

The actuator of claim 151 that is less than 100 μmmicrons in length in any of its 3 dimensional measurements.

Claims 8-11 (cancelled)

Claim 12 (currently amended)

The actuator of claim 1510, wherein the actin/myosin interaction of the two interactive biological materials causes the movement of the movable member along its longitudinal axis.

Claim 13 (currently amended)

The actuator of claim 12, wherein the longitudinal movement of the movable member is unidirectional.

Claim 14 (currently amended)

The actuator of claim 1213, wherein the longitudinal movement of the movable member is bidirectional.

Claim 15 (currently amended)

AnThe actuator of claim 11, comprising:wherein

a movable member that is coated at least in part with myosin;

two separate, parallel arrays of actin filaments that are aligned with respect to a commonalong the same axis of a stationary member but with opposite polarities, whereinand

both of the arrays are positioned to interact with the myosin that is coated on the movable member; and

twoa separate energy-transmitting stripes that arestripe is associated with the arrayseach actin array in a manner to selectively energize respective ones of the arrays,an actin array so that when one of the stripes is sufficiently energized, anthe actin/myosin interaction is such that the movablemoveable member is moved substantially linearly from its starting position in a direction parallel to the actin filaments within the arrays.

Claim 16 (currently amended)

The actuator of claim 15, wherein at least one of the stripesthe energy transmitting stripe transmits heat.

Claim 17 (currently amended)

The actuator of claim 16, wherein the movable member is a rod, the parallel actin arrays are arranged such that the actin filaments are parallel to the rod's longitudinal axis, and the rod is moved in a direction parallel toof its longitudinal axis.

Claim 18 (currently amended)

The actuator of claim 158, wherein the actin/myosin interaction of the two interactive biological materials is promoted by a source of chemical potential energy.

Claim 19 (original)

The actuator of claim 18, wherein the source of chemical potential energy is a nucleoside triphosphate.

Claim 20 (original)

The actuator of claim 18, wherein the source of chemical potential energy is adenosine triphosphate (ATP) or 2'-deoxy ATP.

Claim 21 (currently amended)

The actuator of claim 158, wherein the stripes aresecond interactive biological material is inert unless associated with a source of energy, wherein energizing one of the stripes causesthe energy converts the second interactive biological material into a modified energy state so that it interacts with the first biological material to cause the movable member to move relative to itsa starting position.

Claim 22 (withdrawn-currently amended)

The actuator of claim 1, wherein:that comprises

thea movable member hashaving a biocompatible molecular layer deposited thereon,on the surface thereof and the first biological material comprisesa layer of myosin, or a fragment thereof, adhering to at least a portion of the biocompatible molecular layer;

the second biological material comprises at least one array of aligned actin filaments attached to a stationary member and positioned to interact with the myosin coating;

an energy transmitting stripe associated with the actin array in a manner to energize the actin array, wherein the actin array is inert unless energized;

a well containing a substance that is a source of chemical potential energy that aids the interaction of myosin with actin, the well being positioned to retain the substance in contact with the actin array and the myosin layer; and

the actuator further comprisesa hydrophobic regionsregion positioned on opposite sides of the reservoirwell to slidingly engage the movable memberrod and retain the substance within the reservoirwell,

wherein when the energy transmitting stripe is sufficiently energized, the actin/myosin interaction is such that the movable member is moved in a direction parallel to the actin filaments within the array.

Claim 23 (withdrawn)

The actuator of claim 22, wherein the biocompatible molecular layer is a self-assembling monolayer.

Claim 24 (withdrawn)

The actuator of claim 22, wherein the biocompatible molecular layer is a polyelectrolyte multilayer.

Claim 25 (withdrawn)

The actuator of claim 22, wherein the movable member is a rod having a longitudinal dimension of about 100 nm to about 100 μm and a cross sectional dimension of about 5 nm to about 200 nm.

Claim 26 (withdrawn-currently amended)

The actuator of claim 25, wherein the rod comprises~~is~~ a metal selected~~chosen~~ from the group consisting of~~comprising~~ nickel, palladium, platinum, gold, cobalt, permalloy, chromium, and combinations~~mixtures~~ thereof.

Claim 27 (withdrawn)

The actuator of claim 22, wherein the biocompatible molecular layer is about 1 nm to about 200 nm in thickness.

Claim 28 (withdrawn)

The actuator of claim 22, wherein the biocompatible molecular layer circumscribes at least a portion of the length of the movable member.

Claim 29 (withdrawn-currently amended)

The actuator of claim 22, wherein the myosin comprises ~~a~~ myosin S1 ~~unit~~ or ~~a~~ heavy meromyosin ~~unit~~.

Claim 30 (withdrawn-currently amended)

The actuator of claim 22, wherein the energy-transmitting stripe comprises~~associated with the actin array is~~ platinum, nickel, or gold.

Claim 31 (withdrawn)

The actuator of claim 30, wherein the energy-transmitting stripe is about 10 nm to about 250 nm thick and at least 10 nm wide.

Claim 32 (withdrawn-currently amended)

The actuator of claim 22, wherein the first type of energy is heat, electricity, light, or electrochemical energy, the second type of energy is chemical potential energy, and the substance ~~that is the source of potential chemical energy~~ is a nucleoside triphosphate.

Claim 33 (withdrawn-currently amended)

The actuator of claim 32, wherein the nucleoside triphosphate is ATP~~adenosine triphosphate (ATP)~~ or 2'-deoxy ATP.

Claim 34 (withdrawn-currently amended)

The actuator of claim 22, wherein the movable member is a rod having a gold surface, and the biocompatible molecular layer comprises a protein, ~~a~~or peptide, or a compound with the formula R^1SH, R^1SSR^2, R^1SR^2, R^1SO_2H, $(R^1)_3P$, R^1NC, R^1CN, $(R^1)_3N$, R^1COOH, or ArSH, wherein:

R^1 and R^2 each has the formula $X(CH_2)_n$ and, if the~~a~~ compound is substituted with both R^1 and R^2, then R^1 and R^2 are the same or different;

n is 0-30;

Ar is an aryl;

X is $-CH_3$, $-CHCH_3$, $-COOH$, $-CO_2(CH_2)_m-OH$, $-CH_2OH$, ethylene glycol, hexa (ethylene glycol), $-O(CH_2)_mCH_3$, $-NH_2$, $-NH(CH_2)_mNH_2$, halogen, glucose, maltose, fullerene C60, a nucleic acid, a protein, or a ligand; and

m is 0-30.

Claim 35 (withdrawn)

The actuator of claim 34, wherein the compound has the formula R^1SH or ArSH.

Claim 36 (withdrawn)

The actuator of claim 35, wherein the compound is propanedithiol, hexanedithiol, octanedithiol, n-hexadecanethiol, n-docosanethiol, 11-mercapto-1-undecanol, α,α-p-xylyldithiol, 4,4'-biphenyldithiol, terphenyldithiol, or DNA-alkanethiol.

Claim 37 (withdrawn-currently amended)

The actuator of claim 22~~1~~, wherein the movable member is a rod having a surface of aluminum, gallium arsenide, or titanium dioxide, and the~~a~~ biocompatible molecular layer ~~is deposited on the surface, wherein the biocompatible molecular layer~~ comprises a compound with the formula R^1SH or R^1SiCl_3, wherein

R^1 has the formula $X(CH_2)_n$;

n is 0-30;

X is $-CH_3$, $-CHCH_3$, $-COOH$, $-CO_2(CH_2)_mCH_3$, $-OH$, -CH2OH, ethylene glycol, hexa(ethylene) glycol, $-O(CH_2)_mCH_3$, $-NH_2$, $-NH(CH_2)_mNH_2$, halogen, glucose, maltose, fullerene C60, a nucleic acid, a protein, or a ligand; and

m is 0-30.

Claim 38 (withdrawn-currently amended)

The actuator of claim 22, wherein the movable member is a rod having a surface of silicon dioxide, and the biocompatible molecular layer comprises~~compound is~~ a protein, ~~a~~or peptide, or a compound with~~has~~ the formula R^1SH or R^1SiCl_3, wherein:

R^1 has the formula $X(CH_2)_n$;

n is 0-30.

X is $-CH_3$, $-CHCH_3$, $-COOH$, $-CO_2(CH_2)_mCH_3$, $-OH$, $-CH_2OH$, ethylene glycol, hexa(ethylene glycol), $-O(CH_2)_mCH_3$, $-NH_2$, $-NH(CH_2)_mNH_2$, halogen, glucose, maltose, fullerene C60, a nucleic acid, a protein, or a ligand; and

m is 0-30.

Claims 39-68 (cancelled)

Claim 69 (currently amended)

A process for preparing an actuator ~~of claim 1~~, which process comprises:

providing a movable member;

depositing a first biological material~~protein that aids in the contraction or relaxation of muscle~~ on at least a portion of ~~the surface of~~ the movable member;

providing a reservoir having (a) an inner surface having deposited thereon an array of a second biological material~~protein~~ that interacts with the first biological material~~protein deposited on the inner surface~~, (b) an energy-transmitting stripe connecting~~strip contacting~~ the second biological material~~protein so that the end of the stripe away from the array can be connected~~ to a~~an energy~~ source of a first type of energy, and (c) two orifices opposite each other to receive the movable member so that the first biological material~~protein~~ can be positioned within the reservoir; and

providing ~~a substance that is~~ a source of a second type of~~potential chemical~~ energy to aid ~~in the~~ interaction of the first and second biological materials~~proteins~~,

wherein, when the first type of energy is transmitted to the second biological material,~~protein~~ the movable member moves from a starting position to a different position.

Claim 70 (currently amended)

The process of claim 69, wherein the movable member is a rod having a biocompatible molecular layer deposited thereon, and the first biological material is deposited on at least a portion of the biocompatible molecular layer.

Claim 71 (currently amended)

The process of claim 70, wherein the first biological material~~protein~~ is myosin~~,~~ or a fragment thereof, the second biological material~~protein~~ is actin, and the source of the second type of~~potential chemical~~ energy is ATP or 2'-deoxy ATP.

Claim 72 (currently amended)

The process of claim 71, further comprising positioning~~wherein~~ a hydrophobic region ~~is positioned~~ at each of the orifices~~orifice~~ to aid in retaining the ATP or 2'-deoxy ATP within the reservoir.

Claim 73 (currently amended)

The process of claim 70~~72~~, further comprising positioning a~~wherein the~~ hydrophobic region as~~is~~ a collar ~~that is positioned~~ around the rod.

Claims 74-80 (cancelled)

Claim 81 (currently amended)

A combination of at least two actuators of claim 15~~1~~, wherein the actuators function in concert.

Claim 82 (new)

The actuator of claim 15, wherein when another one of the stripes is sufficiently energized, the actin/myosin interaction is such that the movable member is moved substantially linearly back towards its starting position.

Claim 83 (new)

The process of claim 69, wherein the source of the first type of energy is a source of heat, electricity, light, or electrochemical energy.

Claim 84 (new)

The process of claim 69, wherein the stripe comprises platinum, nickel, or gold.

Claim 85 (new)

The process of claim 69, wherein the stripe is about 10 nm to about 250 nm thick and at least about 10 nm wide.

Claim 86 (new)

An actuator, comprising:

a movable member;

a first biological material positioned on at least a portion of the movable member;

a reservoir defining two orifices that are positioned so as to receive opposite ends of the movable member; and

a second biological material positioned within the reservoir so as to interact with the first biological material,

wherein, when the second biological material is sufficiently energized, an interaction of the first and second biological materials is such that the movable member is moved substantially linearly in a direction towards one of the orifices.

Claim 87 (new)

The actuator of claim 86, wherein the movable member is a rod

Claim 88 (new)

The actuator of claim 87, wherein the rod has a longitudinal dimension of about 100 nm to about 100 μm and a cross sectional dimension of about 20 nm to about 200 nm.

Claim 89 (new)

The actuator of claim 86, wherein the first biological material is myosin, and the second biological material is actin.

Claim 90 (new)

The actuator of claim 86, further comprising an energy-transmitting stripe positioned so as to transmit a first type of energy to the second biological material.

Claim 91 (new)

The actuator of claim 90, wherein the first type of energy is heat, electricity, light, or electrochemical energy.

Claim 92 (new)

The actuator of claim 90, further comprising a source of a second type of energy positioned within the reservoir so as to aid the interaction of the first and second biological materials.

Claim 93 (new)

The actuator of claim 92, wherein the second type of energy is chemical potential energy.